AMENDMENTS TO THE CLAIMS

1. (Currently amended) A process for depositing a metal structure on a surface of a workpiece defining a plurality of recessed microstructures, comprising:

(a) exposing the surface of the workpiece to an electroplating bath including a source of metal ions to be deposited on the surface and an organic additive that influences the metal ions to be preferentially deposited within the recessed microstructures relative to a surrounding surface, the recessed microstructures including a sidewall, bottom surface and an opening opposite the bottom surface, wherein the organic additive comprises an accelerator agent;

(b) supplying net forward electroplating power between the surface of the workpiece and an anode disposed in electrical contact with the electroplating bath for a first time period, the first time period and a level of forward electroplating power supplied during the first time period are selected such that metal ions are deposited within the recessed microstructures to at least partially fill the recessed microstructures during the first time period; and

(c) when the fill in the recessed microstructures is at or near the point of planarization, reversing the electroplating power supplied between the anode and the surface of the workpiece for at least a portion of a second time period, the second time period being greater than or equal to ten seconds, the second time period and a level of reverse electroplating power supplied during the second time period are selected to substantially desorb accelerator agent from the deposited metal structure to limit deposition of a bump in an overburden over the at least partially filled recessed microstructures relative to the surrounding surface.

2. (Canceled)

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3. (Previously presented) The process of Claim 1, wherein during the second time period the power that is supplied between the anode and the surface of the workpiece is alternated between pulses of forward power interspersed with pulses of reverse power.

4. (Original) The process of Claim 3, wherein the duration of each pulse of reverse power is greater than 1 millisecond.

5. (Original) The process of Claim 4, wherein the duration of each pulse of reverse power is greater than or equal to 10 milliseconds.

6. (Canceled)

7. (Previously presented) The process of Claim 3 wherein the second time period is greater than or equal to 60 seconds.

8. (Previously presented) The process of Claim 1, wherein the reverse electroplating power is sustained for the duration of the second time period, and further comprising supplying electroplating power between the surface of the workpiece and the anode for a third time period before or after the second time period during which third time period forward and reverse electroplating power is supplied in a series of interspersed pulses.

9-10. (Canceled)

11. (Original) The process of Claim 1, wherein the reverse electroplating power is supplied at a reverse current of absolute magnitude greater than 1 amp.

12. (Original) The process of Claim 1, wherein the reverse electroplating power is supplied at a voltage potential of absolute magnitude greater than 0.05 volts.

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13. (Original) The process of Claim 1, wherein the metal that is deposited comprises copper.

14. (Original) The process of Claim 13, wherein the source of metal ions comprises copper sulfate.

15. (Previously presented) The process of Claim 14, wherein the electroplating bath further comprises a source of chloride ions.

16. (Canceled)

17. (Currently amended) The process of Claim 1, wherein the accelerator agent ~~includes~~ is selected from the group consisting of a mercapto compound, a thiol compound, a compound having the chemical structure S-R_1-S, wherein R_1 comprises an alkyl or an aryl group, and any combination thereof.

18. (Currently amended) The process of Claim 1, wherein the organic additive comprises a ~~suppressor~~ leveler agent.

19. (Currently amended) The process of Claim 18, wherein the ~~suppressor~~ leveler agent comprises a compound including the chemical structure N-R_1-S, wherein R_1 comprises an alkyl or an aryl group.

20. (Currently amended) The process of Claim 1, wherein the organic additive comprises a ~~leveler~~ suppressor agent.

21. (Currently amended) The process of Claim 20, wherein the ~~leveler~~ suppressor agent comprises a polyethylene glycol or polyoxyethylene glycol.

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22. (Original) The process of Claim 1, further comprising supplying forward electroplating power between the surface of the workpiece and the anode for a third time period after the second time period.

23. (Canceled)

24. (Currently amended) A process for depositing a metal structure on a surface of a workpiece defining a plurality of recessed microstructures, comprising:

(a) exposing the surface of the workpiece to an electroplating bath including a source of metal ions to be deposited on the surface and an accelerator agent that is adsorbed on the surface and influences the metal ions to be preferentially deposited within the recessed microstructures relative to the remainder of the surface, the recessed microstructures including a sidewall, bottom surface and an opening opposite the bottom surface;

(b) supplying net forward electroplating power between the surface of the workpiece and an anode disposed in electrical contact with the electroplating bath for a first time period and at a first level of supplied power selected so that metal ions are deposited to at least partially fill the recessed microstructures; [[and]]

(c) pausing the metal deposition at or near a level of fill planarization by reversing the electroplating power supplied between the anode and the surface of the workpiece during at least a portion of a second time period that is greater than or equal to ten seconds, the second time period and a second level of applied power selected to limit the deposition of further metal ions over the at least partially filled recessed microstructures relative to the remainder of the surface and to desorb the accelerator agent from the deposited metal structure to limit the development of a bump in an overburden of metal over the at least partially filled recessed microstructures; and

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(d) supplying net forward electroplating power between the surface of the workpiece and an anode disposed in electrical contact with the electroplating bath for a third time period and at a third level of supplied power selected so that metal ions are deposited to substantially fill the recessed microstructures.

25. (Currently amended) A process for depositing a metal structure on a surface of a workpiece defining a plurality of recessed microstructures while substantially limiting deposition of a bump within a deposited overburden, comprising:

(a) exposing the surface of the workpiece to an electroplating bath including a source of metal ions to be deposited on the surface and an accelerator agent;

(b) supplying net forward electroplating power between the surface of the workpiece and an anode disposed in electrical contact with the electroplating bath for a first period of time and under a first set of plating process parameters such that metal ions are preferentially deposited within the recessed microstructures relative to the remainder of the surface to at least partially fill the recessed microstructures during the first time period, the recessed microstructures including a sidewall, bottom surface and an opening opposite the bottom surface; and

(c) when the fill in the recessed microstructures is at or near the point of planarization, supplying electroplating power between the anode and the surface of the workpiece during a second time period in a series of forward plating power pulses interspersed with reverse plating power pulses to substantially desorb the accelerator agent from the deposited metal structure and limit the deposition of a bump in a metal overburden over the at least partially filled recessed microstructures relative to the remainder of the surface, the second time period being greater than or equal to ten seconds.

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26. (Currently amended) A process for depositing a metal structure on a surface of a workpiece defining a plurality of recessed microstructures to substantially limit deposition of a bump within a deposited overburden, comprising:

(a) exposing the surface of the workpiece to an electroplating bath including a source of copper ions, an acid, a source of chloride ions and an organic additive that influences copper ions to be preferentially deposited within the recessed microstructures relative to the remainder of the surface, the recessed microstructures including a sidewall, bottom surface and an opening opposite the bottom surface, wherein the organic additive comprises an accelerator agent and does not include a leveling agent;

(b) supplying net forward electroplating power between the surface of the workpiece and an anode disposed in electrical contact with the electroplating bath for a first period of time and at a first level of supplied power such that copper ions are preferentially deposited within the recessed microstructures relative to the remainder of the surface to at least partially fill the recessed microstructures during the first period of time; and

(c) supplying electroplating power between the anode and the surface of the workpiece during a second time period in a series of forward plating power pulses interspersed with reverse plating power pulses to substantially desorb the accelerator agent from the deposited metal structure and limit the deposition of a bump in a metal overburden over the at least partially filled recessed microstructures relative to the remainder of the surface, the second time period being greater than or equal to ten seconds.

27. (Canceled)

28. (Currently amended) An electroplating apparatus for applying a metal structure to a surface of a workpiece defining a plurality of recessed microstructures, comprising:

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(a) a reactor for receiving the surface of the workpiece and exposing the surface to an electroplating bath including a source of metal ions and an organic additive that influences the metal ions to be preferentially deposited within the recessed microstructures relative to the remainder of the surface, wherein the organic additive comprises an accelerator agent;

(b) an anode in electrical contact with the electroplating bath;

(c) a power supply for supplying electroplating power between the surface of the workpiece and the anode to electroplate the metal ions onto the surface, the power supply being capable of supplying forward power and reverse power; and

(d) a controller for controlling the power supply to supply a level of net forward electroplating power during the first time period so that the metal ions are deposited within the recessed microstructures to at least partially fill the recessed microstructures during the first time period and, when the fill in the recessed microstructures is at or near the point of planarization, to supply a level of reverse electroplating power for at least a portion of a second time period to substantially desorb the accelerator agent from the deposited metal structure and limit the deposition of a bump in a metal overburden over the at least partially filled recessed microstructures relative to the remainder of the surface, the second time period being greater than or equal to ten seconds.

29. (Previously presented) The apparatus of Claim 28, wherein the controller is operable to control the power supply during the second time period so that the power that is supplied between the anode and the surface of the workpiece is alternated between pulses of forward plating power interspersed with pulses of reverse plating power.

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30. (Previously presented) The apparatus of Claim 28, wherein the controller is operable to control the power supply to supply sustained reverse electroplating power for the duration of the second time period, wherein the controller is further operable to control the power supply to supply electroplating power between the surface of the workpiece and the anode for a third time period during which forward and reverse electroplating power is supplied in a series of interspersed pulses.

31. (Previously presented) The apparatus of Claim 28, wherein the controller is operable to control the power supply to supply forward electroplating power between the surface of the workpiece and the anode for a third time period after the second time period.

32. (Previously presented) The process of Claim 1, wherein during the first time period, metal ions are deposited on the surface and within the recessed microstructures.

33. (Previously presented) The process of Claim 3, further comprising periods of off power between the pulses of forward power and the pulses of reverse power.

34. (Previously presented) The process of Claim 25, further comprising periods of off power between the forward plating power pulses and the reverse plating power pulses.

35. (Previously presented) The process of Claim 24, wherein reversing the electroplating power supplied between the anode and the surface of the workpiece during at least a portion of a second time period is provided by alternating pulses of forward power interspersed with pulses of reverse power with periods of off power between the pulses of forward power and the pulses of reverse power.

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36. (Previously presented) The process of Claim 26, further comprising periods of off power between the forward plating power pulses and the reverse plating power pulses.

37. (Previously presented) The apparatus of Claim 29, wherein the controller is operable to control the power supply so that periods of off power exist between the pulses of forward plating power and the pulses of reverse plating power.

38. (Previously presented) The apparatus of Claim 29, further comprising a diffuser plate between an anode and a location of the workpiece when the workpiece is received by the reactor.

39. (Previously presented) The process of Claim 1, wherein the reverse electroplating power is supplied at a reverse current density of absolute magnitude greater than about 3 mA/cm^2.

40. (New) The process of Claim 1, wherein the electroplating bath includes metal ions selected from the group consisting of copper, nickel, chromium, zinc, tin, gold, silver, lead, cadmium, and solder baths.

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